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Does financial risk and fiscal decentralization curb resources curse hypothesis in China? Analyzing the role of globalization

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ABSTRACT

On the role of natural resources, extensive studies are available, especially in a country's financial development. However, earlier studies ignored the role of fiscal decentralization and improvement in financial risk index in interaction with natural resources rent. Therefore, this study attempts to investigate whether fiscal decentralization and improvement in financial risk index curb the resources curse hypothesis for China or not. For this purpose, quarterly data from 2005Q1-2016Q4 is employed using advanced time series econometric approaches that deal with multiple structural breaks. This study uses an updated indicator that covers the efficiency, depth, and accessibility of financial institutions and markets for financial development. The findings confirm China's resource curse hypothesis; however, increasing fiscal decentralization and financial risk index improvement avoid the resource curse hypothesis. Moreover, globalization, gross domestic product, fiscal decentralization, and financial risk index improvement positively affect financial development. The policy implications focus on increasing fiscal decentralization to effectively utilize natural resources and improve the financial risk index to avoid the resource curse hypothesis.

1. Introduction

Natural resources are considered important economic assets and, hence, play a vital role in employment generation, economic development, and improving living standards (Badeeb et al., 2017). Natural resources make a significant contribution to a nation's wealth and play a key role in poverty reduction efforts (Beck et al., 2006). However, the impact of natural resources on improving economic performance depends on the utilization of these resources. With efficient utilization of natural resources, great prosperity can be achieved; however, poor utilization of these resources can result in economic instability and conflicts and, ultimately, poor economic performance (resource curse). This is evident from the failure of many resource-rich countries to reap the benefits from their resources. For instance, Middle East, Africa, and Latin America regions, despite the abundance of natural resources reserves and the world's leading exporters of oil, failed to reap the benefits from their resources (Badeeb et al., 2017). On the other spectrum, Norway, the USA, Canada, and China are resource-rich countries and have succeeded in turning the curse into a blessing by achieving remarkable economic performance. Moreover, there is evidence of the remarkable performance of some resource-scarce countries. Hence, the relationship between natural resources and economic performance is inconclusive.

The researchers with contradictory empirical shreds of evidence intensively examine the relationship between natural resource rent (NRR) and financial development (Badeeb et al., 2017; Nawaz et al., 2019; Shahbaz et al., 2018; Zaidi et al., 2019; Zhang and Brouwer, 2020). The majority of the previous studies have supported the resource curse hypothesis, the term coined by Richard Auty in 1993. The seminal work of North (1990), by introducing institutions' role in turning the natural resource curse into a blessing, provides a solid foundation for future work. Later on, researchers introduced human capital, economic growth, Research and Development, and technological progress as additional explanatory variables in testing the resource curse hypothesis. According to (Dwumfour and Ntow-Gyamfi, 2018a), the nexus between NRR and FD depends on institutional quality and political stability. In the absence of these factors, achieving economic rents through the utilization of natural resources is not possible. Moreover, to strengthen NRR and FD's relationship, the financial indicators' stability is a prerequisite (Zaidi et al., 2019) and (Canh and Thong, 2020).

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Similarly, trade openness is another important indicator, which helps turn natural resources into economic rents and financial development (Wajda-Lichy et al., 2019). An increased degree of trade openness stimulates economic activities, resulting in higher financial development (Gottweis and Kim, 2010) and (Canh and Thong, 2020). However, without a proper scheme of government's fiscal expenditures and revenues, financial deepness targets are not possible. Fiscal decentralization is a tool to improve public service delivery by devolving the powers related to revenues and expenditures to lower state units (Oates, 1999). The local government has certain advantages in managing regional development and stimulates economic activities, resulting in higher financial development. Moreover, fiscal decentralization may affect financial development through self-financing, co-financing arrangements and intergovernmental transfers by the central government to local unit of the state. By improving these measures, fiscal decentralization deepens the financial system of the country. Further, fiscal decentralization has a beneficial impact on knowledge spillovers, technological diffusion, and competition among the state units, which result in improving regional financial efficiency (Liu et al., 2016). The relationship is not, however, positive in all cases. In some cases, the state's lower unit's access to financial markets may create unexpected fiscal liabilities for the central government, negatively affecting financial development (Group, 2016). Moreover, without mitigation of financial risk, the abundance natural resources turn into worsening financial performance. Financial risk improves banks' profitability and performance, which in turn affects financial development. With a population of 1.4 billion people, China is blessed with rich natural resources, including coal, fertile land, rare earth metals, timber, gold, phosphates, and zinc. The country contributes 30% to total world output and is the world's second-largest economy (Gehring et al., 2019). Hence, the economy, endowed with rich natural resources (to be worth $23 trillion), remarkably performed in the last two decades. Moreover, China is one of the most highly decentralized countries in the world. In recent years, the country's weak economic performance is attributed to low technological innovation and tensions with the US (Khan et al., 2020a,b,c). Unfortunately, few studies have explored the relationship in China's case with minimal efforts to add additional important determinants of financial development (Qian et al., 2019; Xu et al., 2016; Zhang et al., 2015; Zhao et al., 2016). Nevertheless, the existing studies are subject to major shortcomings by using first-generation cointegration techniques. Hence, it is interesting to analyze the role of financial risk and fiscal decentralization in testing the resource curse hypothesis.

The reminder paper is divided into four sections: Section 2 reviews of earlier studies. The framework and techniques used for analysis are illustrated in section 3, and the empirical findings in section 4. The conclusions and policy outcomes are drawn in section 5.

2. Literature review

In the literature, the role of financial development (FD) in affecting domestic productivity is well explained (Ali and Malik, 2020). Moreover, the literature on determinants of FD is rich (Agyemang et al., 2018). Using the data of Africa, Agyemang et al. (2018) identified institutional development as important determinant of financial development. Andersen and Tarp (2003) considered financial liberalization as important factor responsible for financial development in case of least developed countries. Using the bank level data of emerging market economies, Ashraf (2018) considered trade and financial openness as important for financial development. Beck et al. (2006) argue that banking services are essential for FD. Using the data of African countries, Ibrahim and Sare (2018) found that trade openness and human capital are prerequisite for financial development. Le et al. (2016) in case of emerging economies found that institutional quality and trade openness are important for financial development. Zaidi et al. (2019) considered globalization and human capital as important factors responsible for financial development. Using the data set of 124 countries, Ali and Malik (2020) argue that globalization is important determinant of financial development. Using the dataset of China, Zhang et al. (2015) found that trade openness and financial openness are important for financial development. Using the dataset of in the New EU Member States, Wajda-Lichyet al. (2019) argue that trade openness is important factor responsible for financial development. To sum up, in the existing literature, trade openness, human capital, business environment, institutional quality, trade, bank finance, trade openness and financial openness are considered important determinates of financial development.

The issue of possible relationship between natural resources and financial and financial development, the literature is rich (Zhang and Brouwer, 2020). Most of the previous studies have confirmed the resource curse paradox; a negative impact of the natural resource rent on financial development in resource-rich countries (Dwumfour and Ntow-Gyamfi, 2018b; Guan et al., 2020; Satti et al., 2014; Yuxiang and Chen, 2011; Khan et al., 2020a,b,c). In contrast, Zhao et al. (2016) found that natural resources are a blessing. It uses different mechanisms to check the resource curse hypothesis, including other important financial development determinants. Khan et al. (2020)a,b,c using the data for China, added technological innovation and human capital as complementary factors in testing the resource curse hypothesis. The authors confirmed the presence of resource curse; however, developed human capital and technological innovation weakens the relationship between NRR and FD. Hence, developed human capital and technological innovation turn the curse into blessing. Canh and Thong (2020) using the data for large sample of 86 countries over the period 2002–2017, investigated the linkages between NRR and FD. The authors introduced economic globalization, human capital and FDI as additional explanatory variables in the model. The findings of the study reveal that the relationship between NRR and FD depends on income of the country. In high income countries, the natural resources are not result in high economic performance and FD. However, the relationship is strong in middle income countries. Abdulahi et al. (2019) found that the validity of resource curse hypothesis depends on the institutional quality. Shahbaz et al. (2018) using the data of USA tested the resource curse hypothesis. The authors found that by adding additional variables such as education, growth and capitalization alter the nexus between NRR and FD. Similarly, Zaidi et al. (2019) using the data of 31 selected OECD countries 1990–2016 found that the variables globalization and human capital turn the curse into blessing. In case of China, few authors have tested the resource hypothesis (Qian et al., 2019; Xu et al., 2016; Yartey, 2010; Zhang and Brouwer, 2020; Zhao et al., 2016). Majority of these authors have confirmed the negative relationship between NRR and FD in resource rich regions of China. Zhang and Brouwer (2020) discussed that the resource curse is due to the exports of natural resource products and continuous growth in resource industries, which result in inadequate investment in manufacturing industries. Moreover, due to single industry structures, there is high probability of resource curse (Qian et al., 2019). Further, due to low degree of technological innovation and low human capital investment, NRR negatively affect FD in China (Zhang and Brouwer, 2020). Fiscal decentralization is ignored by the researchers in testing the resource curse hypothesis due its indirect impact on financial development, which is hard to assess. To date, no conclusive study is appeared to explain the phenomenon comprehensively. So, it would be a significant attempt to investigate fiscal decentralization in determining financial development.

This study contributes to the existing literature in multifaceted ways: first, this study tests the resource curse hypothesis in the presence of fiscal decentralization and financial risk and other variables. Previous studies have included different institutional and economic factors in the relationship between NRR and FD. This study introduced fiscal decentralization, financial risk, and globalization as additional variables in NRR and FD's relationship. the role of fiscal decentralization and financial risk in the resource curse hypothesis is ignored due to the fact that the indirect impact of these variables on FD is hard to assess. Hence,

in this novel study, we examine the complementarities of natural resource rent with fiscal decentralization and financial risk in affecting the financial system of China. This study employs advance econometric technique with emphasis on structural breaks.

3. Theoretical framework, variables description, and empirical methodology

3.1. Theoretical framework and variables description

Fig. 1 presents the conceptual framework for the relationship between financial sector performance and its determinants. Financial sector performance is measured by a comprehensive index of depth, efficiency and accessibility of financial markets as well as institutions. This study uses total natural resource rent as core explanatory variable to examine its impact on financial deepness, an approach consistent with earlier studies (Dwumfour and Ntow-Gyamfi, 2018b; Guan et al., 2020; Satti et al., 2014; Yuxiang and Chen, 2011; Khan et al., 2020a,b,c).

The theoretical rationale for the resource curse hypothesis is based on the idea of Auty; resource-rich countries are unable to utilize their resources to boost their economies (Beck, 2002). stated that the abundance of natural resource sectors draws skills and investment away from the financial sector, weakening financial sector performance. Moreover, the abundance of natural resources is associated with low utilization of these resources, resulting in economic instability and conflicts and, ultimately, poor economic performance (resource curse).

Following Gottweis and Kim (2010) and Canh and Thong (2020), we include GDP as important control variable, which is expected to have positive impact on financial deepness. The theoretical rationale behind the positive impact of GDP on FD is based on the idea of Gottweis and Kim (2010) who argue that globalization helps in turning natural resources into economic rents and financial development. An increased degree of trade openness stimulates economic activities, resulting in higher financial development. In this seminal work, we introduce fiscal decentralization as important explanatory variable of financial deepness. The theoretical rationale for using fiscal decentralization in the model is based on the idea that fiscal decentralization affects financial development through self-financing, co-financing arrangements and intergovernmental transfers by the central government to local unit of the state. By improving these measures, fiscal decentralization deepens the financial system of the country.

Moreover, we introduce financial risk as additional variables in the model. The theoretical rationale for the positive relationship is based on the idea that financial risk affects lending and borrowing decisions of the firms, which in turn affect financial development. Moreover, lower financial risk improves banks' profitability and performance, which in turn affects financial development. This study introduces the interactive terms of natural resource rent with fiscal decentralization and financial risk in order to gauge the combined effect of these variables on financial development. Based on the Resource Curse theory hypothesis, we hypothesize that the relationship between NRR and FD depends on some preconditions such as fiscal decentralization and financial risk, which determine the presence or absence of the Resource Curse China.

3.2. Model specification

This study explores the association between financial development and its determinants for China using quarterly data from 2005Q1-2016Q4. This study uses financial development (FD) as a dependent variable based on the theoretical framework, followed by fiscal decentralization (FISD), total natural resources rent (TNR), gross domestic product (GDP), financial risk index (FRI), and globalization (GL) as independent variables.

$$FD_t = \gamma_1 TNR_t + \gamma_2 FISD_t + \gamma_3 GDP_t + \gamma_4 GL_t + \gamma_5 FRI_t + \varepsilon_t \quad (1)$$

In Model-1, the role of fiscal decentralization and total natural resources rent has been traced along with other controlled variables such as GDP, GL and FRI. Further, this study adds a multiplicative term for fiscal decentralization and total natural resources to check the effect of natural resources rent once we incorporate the role of fiscal decentralization. Based on the theoretical framework, this study specifies the following models for estimation:

$$FD_t = \gamma_1 TNR_t + \gamma_2 FISD_t + \gamma_3 GDP_t + \gamma_4 GL_t + \gamma_5 FRI_t + \gamma_6 FISD{*}TNR_t + \varepsilon_t \quad (2)$$

In Model-2, the joint effect of fiscal decentralization and total natural resources rent is specified. This is mainly to assess the role of fiscal decentralization in curbing the resources curse hypothesis. Further, this study also adds a multiplicative term for financial risk and total natural resources to check the effect of natural resources rent once we incorporate the role of financial risk. Based on the theoretical framework, this study specifies the following models for estimation:

$$FD_t = \gamma_1 TNR_t + \gamma_2 FISD_t + \gamma_3 GDP_t + \gamma_4 GL_t + \gamma_5 FRI_t + \gamma_6 FRI{*}TNR_t + \varepsilon_t \quad (3)$$

In Model-3, the role of the financial risk of China has been jointly analyzed with natural resources rent. This is mainly to assess whether a country's financial risk matters for financial development and natural resources. Where *FISD*TNR* and *FRI*TNR* is for the interactive term of fiscal decentralization and financial risk index with total natural resources rent. Moreover, "*t*" is for a time period starting from 2005Q1 to 2016Q4. Table 1 presents the descriptive statistics of variables used model 1–3.[1]

3.3. Econometric techniques

3.3.1. Narayan and pop (NP, 2010) Unit root test

To test the unit root properties of FD, FISD, FRI, TNR, GDP and GL, this study uses a (Narayan and Popp, 2010) unit root test. NP approach is an augmented dickey fuller (ADF) type test. This test is superior to conventional unit root tests that do not deal with structural breaks, i.e., Phillips-Perron (PP), Dickey-fuller (DF), and ADF due to its high power, accurately identifying structural breaks and correct size. This test can trace up to two unknown breaks in the data level and slope (Narayan and Popp, 2010). Moreover, this approach also allows for structural breaks both in the alternative and null hypothesis (Narayan and Popp, 2010). Since ignoring structural breaks in the data may lead to provide inconsistent and biased results with acceptance of false unit root hypothesis (Perron, 1989; Ali et al., 2020). The null hypothesis of the NP test support that $\rho = 1$ and the alternative suggest that $\rho < 1$.

3.3.2. Bayer and hanck (BH) cointegration test (without structural breaks)

This study uses a newly developed approach called Bayer and Hanck Cointegration test for cointegration analysis without structural breaks. This method combines Johansen (J), Engle-Granger (EG), Boswijk (Bo), and Banerjee (Ba) tests. To employ the BH test, the integrated order of each variable should be I(1). The null hypothesis of BH is for no cointegration, and the alternate indicate cointegration. The BH test equation is given as:

$$EG - J = -2\left[\ln\left(P^{EG}\right) + \ln\left(P^{J}\right)\right] \quad (7)$$

$$EG - J - Bo - Ba = -2\left[\ln\left(P^{EG}\right) + \ln\left(P^{J}\right) + \ln\left(P^{Bo}\right) + \ln\left(P^{Ba}\right)\right] \quad (8)$$

Whereas, P is for p-values of each cointegration test. $EG - J$ and $EG - J - Bo - Ba$ are critical values.

3.3.3. Maki cointegration test with structural breaks

Unlike Hatemi-J and Gregory and Hansen cointegration approaches,

[1] Data sources and a list of variables are provided in Table-1 as.

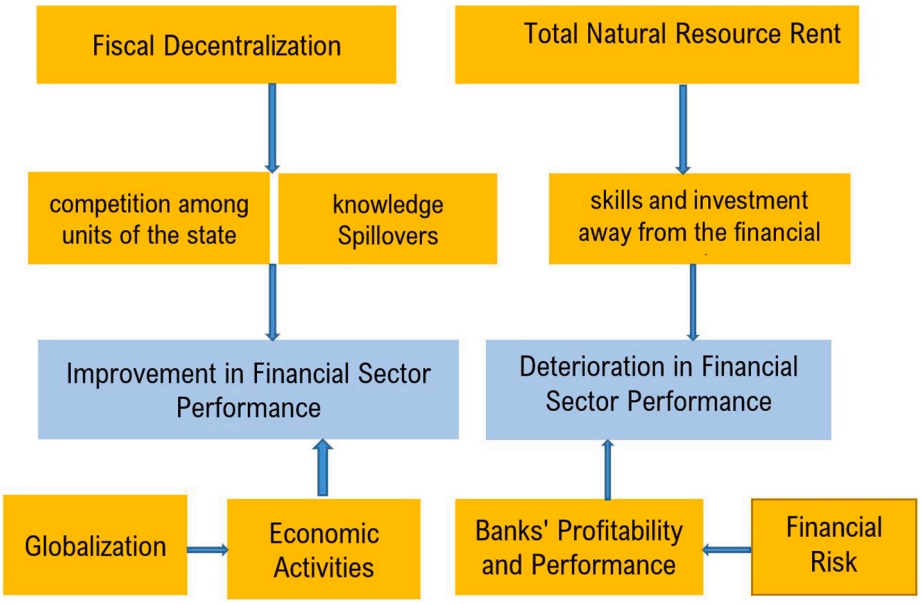


Fig. 1. Conceptual framework.

Table-1
Descriptive statistics of variables.

	FD	GDP	GL	FISD	FRI	TNR
Mean	0.494368	6.42E+12	57.13253	0.400809	47.46875	4.841067
Median	0.484141	6.38E+12	60.21706	0.393558	47.50000	5.113834
Maximum	0.618216	9.72E+12	67.75311	0.491374	48.50000	10.35421
Minimum	0.421645	3.42E+12	−3.410182	0.358227	44.83333	1.139210
Std. Dev.	0.064229	1.89E+12	12.34714	0.033934	0.663696	2.585241
Skewness	0.632864	0.082532	−3.681575	1.059697	−1.825555	0.334163
Kurtosis	2.279440	1.792939	16.35092	3.615105	7.154810	2.305439
Jarque-Bera	4.242546	2.968485	464.9259	9.740370	61.18610	1.858148
Probability	0.119879	0.226674	0.000000	0.007672	0.000000	0.394919
Observations	48	48	48	48	48	48

this study uses a recently developed (Maki, 2012) cointegration test. This test is useful to establish the long-run cointegration among variables, i.e., FD, FISD, GDP, GL, FRI, and TNR, and identify up to five structural breaks (Z. Khan et al., 2020a,b,c). Since single or even two structural breaks may be misleading if more than two structural breaks exist; therefore, Maki cointegration is useful in such a situation (Z. Khan et al., 2020a,b,c). The null hypothesis for Maki supports no cointegration, and the alternative is for cointegration. The general equation of the Maki test for regime shift and the trend is given as:

$$FD_t = \pi + \sum_{i=1}^{k} \pi_i D_{i,t} + \beta' INDV_t + \delta t + \sum_{i=1}^{k} \delta_i t D_{i,t} + \sum_{i=1}^{k} \beta_i' Z_t D_{i,t} + \varepsilon_t \quad (9)$$

Where in equation (9), INDV is for all independent variables such as FISD, GDP, GL, FRI, and TNR having integration of order one, ε_t is for the residuals, $D_{i,t}$ value is 1 when $t > T_{STB,i}$ where $"i"$ takes value from one to $"k"$ and its value is 0 when $t < T_{STB,i}$. Further, $T_{STB,i}$ shows structural breaks. Moreover, π is for a level shift, δ for regime shift and trend, level shift with trend capture changes both in (π) and (Z_t) the regressors is known as a regime shift.

3.3.4. *Fully modified ordinary least square (FMOLS) and frequency domain causality (FDC) test*

For the long-run association between FD and its determinants, i.e., fiscal decentralization, gross domestic product, financial risk index, globalization, and total natural resources rent, this study uses FMOLS. This approach uses a semi-parametric for eliminating the problem of correlation between stochastic regressors and cointegration equations. FMOLS is asymptotically unbiased and efficient (Hansen and Phillips, 1990). FMOLS is considered as important estimator in dealing with the problem of bias, endogeneity and serial correlation. To deal with the problem of endogeneity and serial correlation, FMOLS uses a non-parametric approach. Moreover, another advantage of using FMOLS is that it uses fewer degree of freedom than DOLS to correct for endogeneity and serial correlation (Sadorsky, 2012). Hence, due to these reasons, this study employs FMOLS method to estimate the models. For short, medium, and long-run causality among financial development, gross domestic product, fiscal decentralization, financial risk index, and total natural resources, this study used the FDC test. This approach is allowing for eliminating seasonal variations in the dataset with a short period. It is also robust to causality cycles and non-linearities (Khan et al., 2020a,b,c). This approach allows for capturing both high and low-frequency causalities. In the next section, results are provided based on these aforementioned techniques.

4. Results and discussions

The (Narayan and Popp, 2010) test results are estimated to intercept and intercept with a trend for level and first difference. The outcomes show that all the variables, i.e., financial development, fiscal decentralization, globalization, gross domestic product, total natural resources rent, and financial risk index, are stationary at first difference. This shows that all these variables do not have a constant mean and variance at the level.

Besides unit root properties, the NP test provides two structural breaks for each series. These structural breaks are reported in Table-2 These structural breaks are associated with different global and local shocks that disturb the path of the economy. The important structural breaks in the context of the Chinese economy are 2008Q1, 2015Q1, and 2013Q1. The structural breaks in 2008, 2010, 2013, and 2015 are linked with global financial crises, the slowdown of economic activities in 2010, the launching of China's Belt and Road initiative (BRI) in 2013, which have significant implication for core variables of the study.

The results for the Bayer-Hanck cointegration test are reported in Table-3 The results report cointegration outcomes without structural breaks. The results for both Engle-Granger-Johansen and Engle-Granger-Johansen-Banerjee-Boswijk test statistic confirm cointegration for all three models. This confirms that financial development and its determinants, i.e., fiscal decentralization, total natural resources rent, gross domestic product, globalization, financial risk index, an interactive term for fiscal decentralization, and financial risk index with total natural resources rent, are cointegrated. The results for the Bayer-Hanck cointegration test are significant at the 5% level.

The results for Maki cointegration are reported in Table-4 for all three regime shifts with the trend. The results confirm cointegration for all three models. This confirms that financial development and its determinants, i.e., fiscal decentralization, total natural resources rent, gross domestic product, globalization, financial risk index, an interactive term for fiscal decentralization, and financial risk index with total natural resources rent, are cointegrated. Moreover, the results also provide up to three structural breaks for each model. However, important structural breaks are 2008Q1, 2010Q4, 2013Q2, and 2015Q1. These breaks are associated with different economic shocks to the economy, i.e., global financial crises in 2008, the slowdown of economic activities from 2008 to 2010, and BRI's launching in 2013, which have significant core implications variables of the study.

Table-5 reports the outcomes of all three models using FMOLS. The outcome confirmed gross domestic product, fiscal decentralization, financial risk index, and globalization are positively linked with financial development in all three models. Moreover, total natural resources rent inversely affects FD, which confirms the resource curse hypothesis in China's case. A one percent increase in total TNR causes FD to fall by [-0.10%, −0.37%, −1.90%] for all three modes, respectively. However, the interactive term between TNR and fiscal decentralization enters the model positively and statically significant, which implies that negative effect of an increase in NRR on FD is lower when the degree of fiscal decentralization is increased. Hence, the nexus between NRR on FD depends on fiscal decentralization. Similarly, the interactive term between NRR and financial risk enters the model positively and statically significant, which implies that NRR positively affects FD if financial risk is low.

Table-2
Results of unit root test.

Variables	Level I(0)		First Difference I(1)		Structural Breaks
	Intercept	Trend and Intercept	Intercept	Trend and Intercept	
FD	−7.149***	−3.561	−8.349***	−6.720***	2008Q3-2010Q2
GDP	−3.097	−2.540	−4.222*	−9.446***	2008Q1-2014Q4
GL	−2.628	0.840	−20.250***	−10.209***	2007Q4-2015Q1
FISD	−2.858	−2.885	−5.068**	−7.574***	2008Q1-2010Q4
FRI	−3.382	−3.906	−4.639**	−6.691***	2008Q1-2014Q4
TNR	−4.688**	−3.085	−6.801***	−7.623***	2010Q2-2013Q1

Note: Asterisks ***, ** & * is for 10, 5 & 1% significance level.

Table-3
Cointegration test without Structural Breaks.

Bayer-Hanck Cointegration Test		
Models	EG-J	EG-J-Ba-Bo
Model-1 $FD_t = f(FISD_t, TNR_t, GDP_t, GL_t, FRI_t)$	55.73**	61.58**
Model-2 $FD_t = f(FISD_t, TNR_t, GDP_t, GL_t, FRI_t, FISD*TNR_t)$	57.18**	71.15**
Model-3 $FD_t = f(FISD_t, TNR_t, GDP_t, GL_t, FRI_t, FRI*TNR_t)$	56.07**	62.25**

Note: EG-J (Engle-Granger-Johansen), EG-J-Ba-Bo Engle-Granger-Johansen-Banerjee-Boswijk), CV (critical value), ** is for 5% significance level. CV at 5% for EG-J is 10.419 and EG-J-Ba-Bo is 19.888.

Table-4
Cointegration test with Structural Breaks.

Maki Cointegration Test		
Models	t-statistics	Structural Breaks
Model-1 $FD_t = f(FISD_t, TNR_t, GDP_t, GL_t, FRI_t)$	−10.56***	2007Q2-2009Q4-2013Q3
Model-2 $FD_t = f(FISD_t, TNR_t, GDP_t, GL_t, FRI_t, FISD*TNR_t)$	−18.95***	2008Q4-2010Q4-2015Q2
Model-3 $FD_t = f(FISD_t, TNR_t, GDP_t, GL_t, FRI_t, FRI*TNR_t)$	−10.68***	2008Q2-2013Q2-2015Q1

Note: Asterisks ***, ** and * is for 1, 5 and 10% statistical significance.

Table-5
Fully modified OLS (FMOLS) results.

Variables	Model-1 Coefficients [Standard Errors]	Model-2 Coefficients [Standard Errors]	Model-3 Coefficients [Standard Errors]
GDP	0.24*** [0.025]	0.23*** [0.016]	0.22*** [0.027]
TNR	−0.10*** [0.013]	−0.37*** [0.099]	−1.90** [0.709]
FISD	0.32*** [0.076]	0.55*** [0.186]	0.27*** [0.075]
FRI	0.013** [0.005]	0.014** [0.057]	0.017*** [0.004]
GL	0.19** [0.089]	0.14** [0.057]	0.15*** [0.023]
FISD*TNR	–	1.14*** [0.239]	–
FRI*TNR	–	–	0.037** [0.015]
Constant	−3.052*** [0.304]	−3.33*** [0.189]	−1.811*** [0.002]

Note: Asterisks ***, ** and * is for 1, 5 and 10% statistical significance.

Table-6 report the outcomes of FMOLS by incorporating different structural breaks. The outcomes for fiscal decentralization, total natural resources rent, globalization, financial risk index and gross domestic product are similar to the previous findings given in Table-5. However, the effect of structural break in 2008 which is for global financial crises, negatively affect financial development. Similarly, in 2010 and 2014, both structural breaks negatively affect financial development.

Table-7 provides the results of robust regression analysis. The results are consistent with the findings of Tables 5 and 6. Hence, these results confirm that total natural resource rent, fiscal decentralization, GDP, globalization and financial risk are important variables affecting financial development of China.

Note: Asterisks ***, ** & * is for 10, 5 & 1% significance level. ω is for frequency.

Table-8provides results for short-run, medium-run, and long-run

Table-6
Fully modified OLS (FMOLS) results (with structural breaks).

Variables	Coefficients [Standard Errors]	Coefficients [Standard Errors]	Coefficients [Standard Errors]
GDP	0.31***	0.25***	0.24***
	[0.036]	[0.045]	[0.012]
TNR	−0.092***	−0.10***	0.069***
	[0.012]	[0.014]	[0.007]
FISD	0.30***	0.31***	0.33***
	[0.065]	[0.074]	[0.037]
FRI	0.015***	0.014***	0.011***
	[0.004]	[0.005]	[0.002]
GL	0.20**	0.19**	0.17***
	[0.075]	[0.081]	[0.043]
D2008Q1	−0.017**	–	–
	[0.007]		
D2010Q2	–	−0.0023	–
		[0.008]	
D2014Q4	–	–	−0.027***
			[0.004]
Constant	−3.914***	−3.22***	−2.94***
	[0.465]	[0.551]	[0.152]

Note: Asterisks ***, ** and * is for 1, 5 and 10% statistical significance. D is for the dummy variable.

Table-7
Robust regression analysis.

	Model-1 Coefficients	Model-2 Coefficients	Model-3 Coefficients
GDP	0.215***	0.324***	0.272***
TNR	−0.0161***	−0.166***	−0.532**
FISD	0.183*	0.482**	0.413**
FRI	0.0468***	0.0172**	0.0162***
GL	0.0231**	0.132*	0.214***
FISD*TNR	–	1.3825***	–
FRI*TNR	–	–	0.0110****
Constant	−0.932***	−1.042***	−1.0012***

Table-8
Frequency domain causality test.

Causality from Controlled Variables to Financial Development	Long-run ω = 0.75 Wald Statistic (P-Values)	Medium-run ω = 1.50 Wald Statistic (P-Values)	Short-run ω = 2.50 Wald Statistic (P-Values)
GDP	8.49**	11.02***	6.00**
⟶ FD	(0.0143)	(0.004)	(0.049)
FISD	20.53***	10.56***	11.31***
⟶ FD	(0.000)	(0.005)	(0.003)
TNR	17.40***	6.28**	4.00
⟶ FD	(0.000)	(0.043)	(0.135)
GL	9.79***	4.95*	3.40
⟶ FD	(0.007)	(0.083)	(0.182)
FRI	9.65***	5.09*	4.94*
⟶ FD	(0.008)	(0.078)	(0.084)

causality employing frequency domain causality test. The outcomes confirm that any policy targeting gross domestic product and fiscal decentralization shall affect FD in the short, medium, and long-run. Similarly, any policy targeting financial risk index improvement shall affect FD. In contrast, any policy targeting total natural resources rent and globalization shall affect FD in the short and long-run only (Anayiotos and Toroyan, 2009) (Aluko and Ajayi, 2018) (Calderon and Poggio, 2010) (Khan et al., 2020a) (Khan et al., 2020b)

5. Discussion

Overall, the current estimates support resources curse hypothesis for China. The possible reason for the validation of the resource curse hypothesis in China's case is that exports of natural resource products and continuous growth in resource industries result in inadequate investment in manufacturing industries. These results similar the findings of (Beck, 2002; Dwumfour and Ntow-Gyamfi, 2018a; Guan et al., 2020; Qian et al., 2019; Shahbaz et al., 2018; Zaidi et al., 2019). Due to ineffective resource utilization and single industry structures, there is a high probability of resource curse, especially in China's resource-rich regions (Qian et al., 2019). However, through devolution of fiscal responsibilities to the lower unit of the state, the resources curse hypothesis can be avoided. Fiscal decentralization can deepen the financial system of the country through self-financing, co-financing arrangements and intergovernmental transfers by the central government to local unit of the state. These results are consistent with the findings of (Liu et al., 2016). Hence, fiscal decentralization is a solution to improve economic performance and escape the curse driven by resource rents. To strengthen the relationship between NRR and FD, fiscal decentralization is a prerequisite.

Further, improvement in financial risk can help to avoid resources curse hypothesis. Financial risk affects lending and borrowing decisions of the firms, which in turn affect financial development. Moreover, lower financial risk improves banks' profitability and performance, which in turn affects financial development. Moreover, the outcomes suggest that globalization positively affects FD, which supports the earlier findings of (Zhang et al., 2015) and (Le et al., 2016). Increased degree of globalization stimulates economic activities, which in turn result in higher financial development. Hence, globalization is helpful in turning the natural resources into economic rents and financial development.

6. Conclusion and policy implications

Natural resources are considered important economic assets and, hence, play a vital role in employment generation, economic development, and improving living standards. The researchers with contradictory empirical shreds of evidence intensively examine the relationship between NRR and FD. Majority of the previous studies have supported the resource curse hypothesis. However, the earlier studies ignored the role of fiscal decentralization and improvement in financial risk index to overcome the downsides of resources curse hypothesis. This study fills the gap in the literature by including fiscal decentralization in testing resource curse hypothesis. This study introduces the interaction terms of NRR with fiscal decentralization and financial risk in order to gauge the combined effect of these variables on FD.

Therefore, this study aims to examine the effect of NRR on FD in the presence of fiscal decentralization, gross domestic product, financial risk index and globalization for China from 2005Q1-2016Q4. This study further incorporates the joint effect of fiscal decentralization and financial risk index with natural resources rent on financial development. The econometric estimation offers robust results: i) gross domestic product, fiscal decentralization, financial risk index and globalization are positively associated with financial development in case of all three models; ii) total NRR inversely affect FD, which confirms the resource curse hypothesis in case of China; iii) the interactive term between NRR and fiscal decentralization enters the model positively and statically significant, which implies that negative effect of an increase in NRR on FD is lower when the degree of fiscal decentralization is increased; iv) the interactive term between NRR and financial risk enters the model positively and statically significant, which implies that NRR positively affects financial development if financial risk is low; v) an increase in share of subnational government and improvement in financial risk can help to avoid resources curse hypothesis; vi) globalization is helpful in turning the natural resources into economic rents and financial development; vii) any policy targeting fiscal decentralization, NRR, globalization, improvement in financial risk index and gross domestic product shall effect financial development. In terms of policy implications, this study suggests that lowering the financial risk can escape the possible resource curse. Moreover, an increase in share of subnational

government can help to avoid resources curse hypothesis.

6.1. Policy implications

The results of the study have great policy implications. In order to avoid resources curse hypothesis, China needs to further improve its decentralization system. By targeting the characteristics of fiscal decentralization such as self-financing, co-financing arrangements and intergovernmental transfers by the central government to local unit of the state, China can deepen its financial system. Through devolution of fiscal responsibilities to the lower unit of the state, the benefits of technological diffusion and efficiency can be attained. These factors can help the country to avoid the resources curse hypothesis. Moreover, there is a dire need to evolve policies for the financial risk mitigation. Financial risk affects the lending and borrowing decisions of the firms, and hence, has implications for financial system. In case of China, the state and non-state sectors coexist. Hence, lower financial risk will further improve banks' profitability and performance, which in turn will improve the financial system of the country.

Author statement

Kai Pan: Conceptualization, Methodology, Formal analysis, Investigation, Resources, Data curation, Writing - original draft, Writing-review & editing, Visualization, **Cheng-Ping Cheng:** Conceptualization, Software, Formal analysis, Writing-review & editing.**Dervis Kirikkaleli:** Project administration, Writing-review & editing, **Sema Yılmaz Genç:** Validation, Visualization, Writing - original draft.

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Appendix A. Variables Sources and Measurements:

Variables	Measurement	Source
Financial Development (FD)	A multidimensional index that covers depth, efficiency and accessibility of financial markets as well as institutions.	International Monetary Fund (2018)
Fiscal Decentralization (FISD)	It is measured through revenue decentralization as ratio of own revenue to total government revenues.	International Monetary Fund (2018)
Total Natural Resources Rent (TNR)	Total rent from the sum of Coal, mineral, natural gas, forest and oil resources.	World Bank (2018)
Gross Domestic Product (GDP)	Measured at constant, 2010 US dollars.	World Bank (2018)
Globalization (GL)	An index for covering political, social and economic perspective of globalization.	Gygli et al. (2019)
Financial Risk Index (FRI)	FRI measures the overall financial risk of a country and its financial system ability. The index value ranges from 0-50. Where 0.0% is for very high risk and near 50.0% is for low risk.	Gygli et al. (2019)

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